

Review of *Acanthophotopsis* Schuster (Hymenoptera: Mutillidae)

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Abstract.—*Acanthophotopsis snellingi* Tanner and Pitts, sp. nov., is described based on males collected from Chihuahua and Fresnillo, Mexico, which raises the number of species of *Acanthophotopsis* to six. *Acanthophotopsis snellingi* differs from other species of *Acanthophotopsis* by having the following unique combination of characters: the head is elongate, with the lateral margin parallel behind the eyes and converging posteriorly; the basal margin of the clypeus lacks a median longitudinal carina and central tubercle; the mandible is tridentate; and the first flagellar segment is 1.5–2× long as wide. We also report that *A. falciformis furcisterna* is a **junior synonym** of *A. falciformis falciformis*. An illustrated key is given for the species of *Acanthophotopsis*.

Key words.—Nocturnal, Sphaerophthalminae, velvet ant, Nearctic Deserts

Acanthophotopsis Schuster (Hymenoptera: Mutillidae), which belongs to the subfamily Sphaerophthalminae (Brothers 1975; Schuster 1958), is a poorly understood genus of nocturnal velvet ants that is endemic to southwestern North America and known only from males. The natural history of many Sphaerophthalminae, including *Acanthophotopsis*, is poorly known. It is assumed that, similar to other Nearctic Sphaerophthalminae, they are parasitic on spheciform wasps and solitary ground nesting bees (Krombein et al. 1979).

Schuster (1958) described *Acanthophotopsis* with two other genera, *Acrophotopsis* and *Dilophotopsis*. Although these other genera have been treated recently (Pitts and McHugh 2002; Wilson and Pitts 2008), *Acanthophotopsis* has yet to be reviewed. At its description, *Acanthophotopsis* included five species and two subspecies. These species range from the palm desert region of California, east to Oklahoma, and south into the arid Northern regions of Mexico. Species of *Acanthophotopsis* are medium-sized and are largely reddish-brown with

pale white setae throughout the body. At first glance they look like many other nocturnal mutillid genera. This genus, however, can be easily distinguished from other Nearctic sphaerophthalmines by the presences of large mesosternal processes that are conical apically and are directed slightly posteriorly, and by a swollen middle tibia with only a single tibial spur.

Species of this genus are rare in collections. In a study of over 20,000 specimens of nocturnal mutillids from museums throughout the Southwest, only a handful of specimens of each *Acanthophotopsis* species was found, except for *A. falciformis* Schuster. This latter species is found primarily in the USA, while the remaining species of *Acanthophotopsis* range into northern Mexico. The rarity of these species in collections may be due to the difficulty of collecting in Mexico, rather than a true reflection of their natural abundance.

In the course of our studies, we found an undescribed species of *Acanthophotopsis*. We describe this new species and report a new synonymy of the subspecies *A. falciformis falciformis* and *A. falciformis furcisterna*.

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MATERIALS AND METHODS

The following acronyms are for institutions or collections housing the material discussed in the current study:

AEIC	American Entomological Institute, Gainesville, Florida, USA.
AMNH	American Museum of Natural History, New York, New York, USA.
BYUC	Entomology Section, Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, USA.
CASC	California Academy of Sciences, San Francisco, California, USA.
CISC	Essig Museum of Entomology, Department of Entomological Sciences, University of California, Berkeley, California, USA.
EMUS	Department of Biology Insect Collection, Utah State University, Logan, Utah, USA.
KAWC	Kevin A. Williams Personal Collection, Utah State University, Logan, Utah, USA.
NMNH	National Museum of Natural History, Washington, D.C., USA.
NVDA	Nevada State Department of Agriculture, Reno, Nevada, USA.
SEMC	Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA.
UAIC	Department of Entomology Collection, University of Arizona, Tucson, Arizona, USA.
UCDC	The Bohart Museum of Entomology, University of California, Davis, California, USA.
UCRC	UCR Entomological Teaching and Research Collection, University of California, Riverside, California, USA.
UMSP	University of Minnesota Insect Collection, St. Paul, Minnesota, USA.

We adopt the following notation for punctures in the order of decreasing coarseness: reticulate, coarse, moderate, small, fine and micropunctate (Ferguson 1967). Micropunctate punctures are extremely shallow and do not have vertical walls or sharp margins. Fine refers to shallow punctures that have slanted or curved walls and are separated by greater than $10\times$ their width. Small punctures have slightly vertical walls and are separated by $2\text{--}10\times$ their diameter. Moderate refers to punctures that tend to be circular, are separated by $0.5\text{--}2\times$ their width, and have curved to vertical walls. Coarse refers to punctures that are closely spaced ($0.2\text{--}0.5\times$ puncture width) with vertical walls and punctures are usually circular. Reticulate refers to sculpturing that resembles a network of lines with the punctures closely spaced (<0.2 puncture width) with vertical walls. "Simple setae" are setae that are smooth and do not have barbed surfaces. "Brachyplumose setae" are setae with barbs that are less than, or equal to, the diameter of the shaft at the attachment of the barb. "Plumose setae" have longer barbs. We use "tibial spurs" instead of "calcaria" and "paramere" instead of "gonoforcep". The acronyms T2, T3, etc., denote the second, third, etc., metasomal tergites, respectively. Similarly, S2, S3, etc., signifies the second, third, etc., metasomal sternites, and F2, F3, etc., signify the second and third flagellar segments of the antenna, respectively. In the material examined section, an asterisk denotes the specimen which was used to illustrate the genitalia.

Acanthophotopsis Schuster

Acanthophotopsis Schuster, 1958. Ent. Amer. (n. s.) 37: 5 (in key), 88. Type-species: *Acanthophotopsis falciformis* Schuster, Orig. desig.

Male diagnosis.—*Acanthophotopsis* is distinguishable from other nocturnal velvet ants by the large mesosternal processes that are conical apically, slightly directed

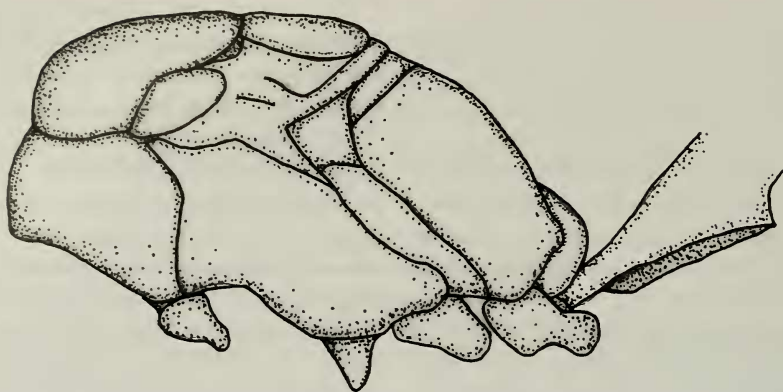


Fig. 1. Mesosoma of *Acanthophotopsis snellingi*. Mesosternal process located anterior to the mesosternal coxae.

posteriorly and easily viewed without a microscope (Fig. 1), and the swollen middle tibia with a single mid-tibial spur. Other characters useful in identifying *Acanthophotopsis* include the ventral tooth of the mandible being small and angulate to slightly rounded, or absent, and followed by a slight emargination. Also, the hypopygidium is unmodified lacking lateral carinae. The parameres are short and stout (Figs 14–19), and have apices that do not overlap *in situ*. The cuspis of the genitalia is densely setose and often curled and spatulate at the extreme apex (Figs 14–19). Lastly, the apical margins of the metasomal segments have sparse setae on the fringes that are at the transition of being termed plumose or brachyplumose.

Females.—Unknown.

Remarks.—We have encountered some specimens of *Acanthophotopsis* that have two mid-tibial spurs, though this condition is rare. Specimens that have a second mid-tibial spur also have a swollen mid-tibia and conical mesosternal processes and are, therefore, still distinguishable from the other North American nocturnal velvet ants. Also, these specimens typically have two mid-tibial spurs on only one leg rather than on both.

Schuster (1958), when describing *Acanthophotopsis*, also described two species-groups: the *A. falciformis* species-group,

which consisted of the two subspecies of *A. falciformis*, and the *A. dorophora* species-group, which includes the remaining four species. We dispense with species-groups in this manuscript because of the small size of the genus, the evidence suggesting that *A. falciformis furcisterna* is a junior synonym of *A. falciformis falciformis*, and because the genus is clearly a homogenous group.

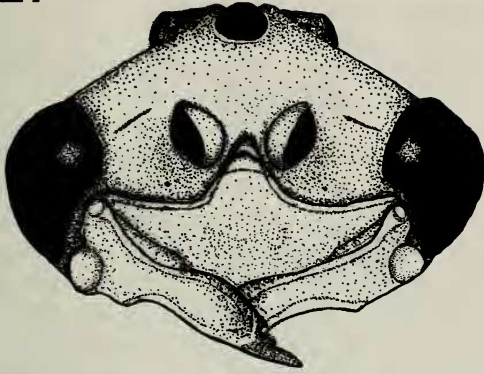
The females of this genus are unknown. Based on unpublished molecular data (ITS1 and ITS2), this genus is closely related to the *Sphaerophthalma blakeii*, *S. baboquivari*, and *S. papaga* species-groups; therefore, the female will likely be similar to the females of these groups.

Acanthophotopsis bequaertii Schuster

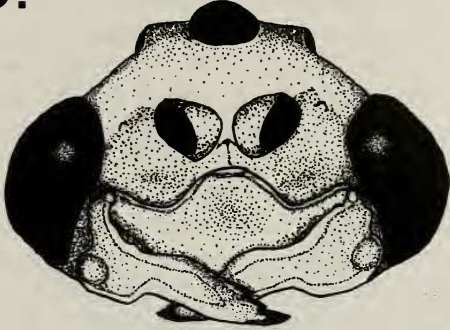
Acanthophotopsis bequaertii Schuster, 1958. Ent. Amer. (n. s.) 37: 12 (in key), 101. male. Holotype: Arizona, Hereford, 16.Sep.1935, coll. F.H. Parker (UMIC).

Male diagnosis.—*Acanthophotopsis bequaertii* is identified by the following unique combination of characters: the mandibles are tridentate, and the dorsal carina of the mandible ends before the apex, such that the apex of the mandible appears to be oblique (Fig. 2). The base of the clypeus is distinctly raised and transversely carinate, but lacks a central tubercle and is not horizontally produced. The head behind

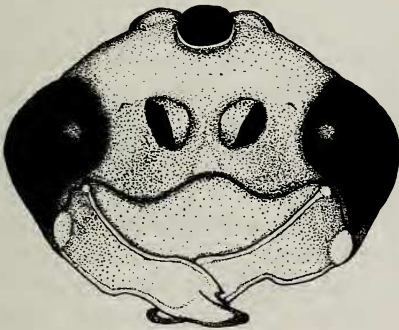
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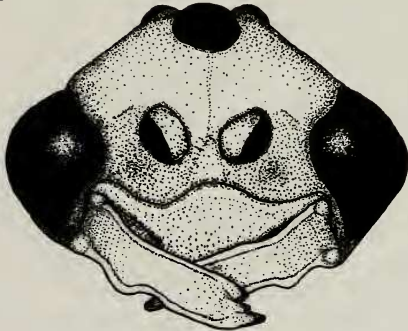
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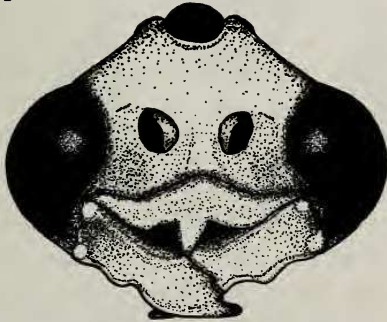
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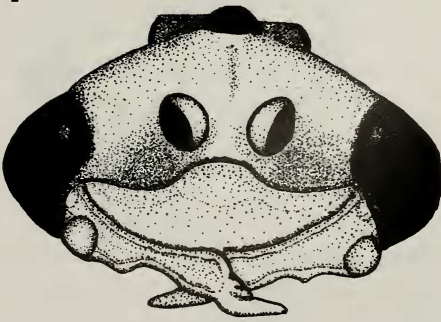
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Figs 2-7. Face of *Acanthophotopsis bequaertii* (2), *A. bifurca* (3), *A. dorophora* (4), *A. evansii* (5), *A. falciformis* (6), and *A. snellingi* (7).

the eyes is elongate with the margins directly posterior to the eyes nearly parallel for a distance equal to one half the length of the eye (Fig. 8). Other characters useful in identifying *A. bequaertii* are: 1) the frons is coarsely punctate while the vertex is moderately punctate, 2) the length of F1 is $1.75\times$ its width, 3) the length of the stigma is nearly equal to the length of the marginal cell along the costa, and 4) the paramere in lateral view is equally broad throughout its length except for the apex, which narrows to an acute angle, and is $4\times$ as broad as the cuspis medially (Fig. 14).

Material examined.—**USA:** **Arizona,** Cochise Co.: 5 mi E Hereford, 1 ♂, 2.Jun.1966, coll. R.F. Sternitzky (EMUS); Portal, 1 mi. S, 1 ♂, 16.Aug.1966, coll. E.G. and J.M. Linsley (CISC), 3 ♂, 25.Aug.1964, coll. J.H. Puckle, M.A. Mortenson, and M.A. Cazier (CISC); Cave Cr. Ranch, 1 ♂, 10.Aug.1969, coll. E.G. Linsley (CISC); Sierra Vista, 1 ♂, 21.Oct.1961, coll. R.F. Sternitzky (EMUS); Sonoita, 1 ♂, 13.Jul.1966, coll. R. Hennessey (CISC); **Santa Cruz Co.:** Canelo, 1 ♂*, 21.Jun.1958, coll. G.D. Butler (UAIC); Parker Canyon Lake, SW slope Huachuca Mts, 12–13.Aug.1968, coll. F. Werner (UAIC). **MEXICO:** **Chihuahua:** Carmargo, 25 mi SW, 1 ♂, 14.Jul.1947, coll. D. Rockefeller Exp. Schramel (AMNH); Camargo, 42 mi SW, 4900', 3 ♂, 5.Jul.1947, coll. D. Rockefeller Exp. Schramel (AMNH); Santa Barbara, 5500', 1 ♂, 20.Jul.1947, coll. D. Rockefeller Exp. Schramel (AMNH). **Durango:** San Juan del Rio, 5200', 1 ♂, 30.Jul.1947, coll. D. Rockefeller Exp. Schramel (AMNH); Encino, 6200', 1 ♂, 27.Jul.1947, coll. D. Rockefeller Exp. Schramel (AMNH).

Remarks.—Previously, this species was only known from the holotype. This species is most likely to be confused with *A. bifurca* (Fig. 15) due to the similarities in the presences of a medial tubercle on the clypeus and the lack of a complete dorsal carina on the mandible, such that the apex of the mandible is not vertical as in the other *Acanthophotopsis* species. The genitalia of these two species differ. The paramere of *A. bequaertii* (Fig. 14) is thicker and the apex of the cuspis is more obviously lobed.

Acanthophotopsis bifurca Schuster

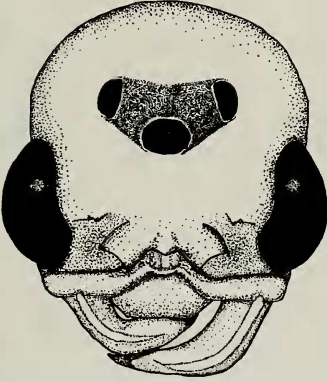
Acanthophotopsis bifurca Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 98. male. Holotype: Texas, Winterhaven, 15.May.1935, coll. S.E. Jones (UMIC).

Male diagnosis.—*Acanthophotopsis bifurca* is identified by the following unique combination of characters. The mandibles are tridentate and the dorsal carina of the mandible ends before the apex of the mandible, such that the apex of the mandible appears to be oblique (Fig. 3). The base of the clypeus is raised into a slight transverse median tubercle, but the anterior portion of the clypeus not horizontally produced. The head behind the eye is convergent giving the head a rounded appearance (Fig. 9). Other characters useful in identifying *A. bifurca* are: 1) the frons is coarsely punctate while the vertex is moderately punctate, 2) the length of F1 is $2\times$ its width, 3) the length of the stigma is $0.75\times$ the length of the marginal cell along the costa, and 4) the paramere in lateral view is equally broad throughout its length except for the apex, which narrows to an acute angle, and the paramere is $2-3\times$ as broad as the cuspis medially (Fig. 15).

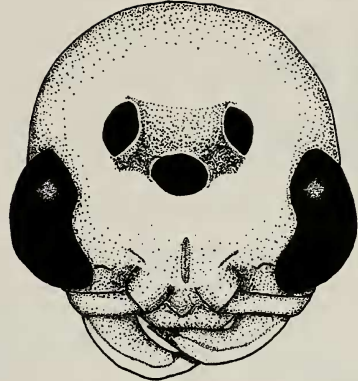
Material examined. **USA:** **Oklahoma,** Kiowa Co., Lugert, 1 ♂, 11.Jun.1937, coll. Standish-Kaiser (UAIC). **New Mexico,** Eddy Co., 1 ♂, 12.Jul.1927, coll. R.H. Beamer (SMEC). **Texas,** Val Verde Co.: 1 ♂*, 6.May.1941, coll. D.J. and J.N. Knull (UMSP); Del Rio, 2 ♂, 25.Apr.1959, coll. W.R.M. Mason (EMUS); 1 ♂, 10.Sep.1976, coll. J.A. Powell and J.A. Chemsak (CISC); Kinney Co., Brackettville, 1 ♂, 4.May.1950 (CISC).

Remarks.—Previously, this species was only known from the holotype and two paratypes. We were unable to locate the two paratypes. This species would most likely be confused with *A. bequaertii*; see the discussion in the remarks section for *A. bequaertii* for characters useful in distinguishing these two species.

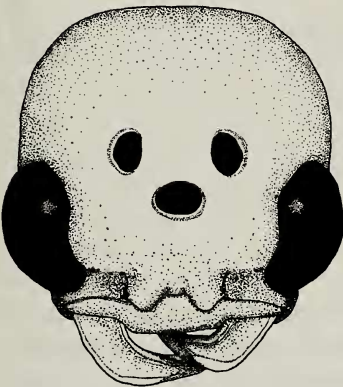
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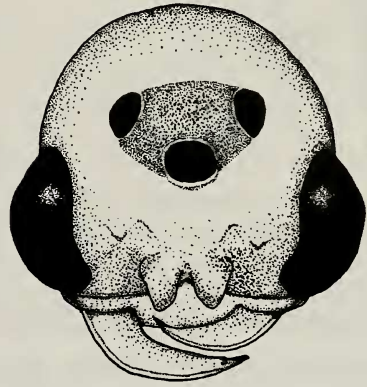
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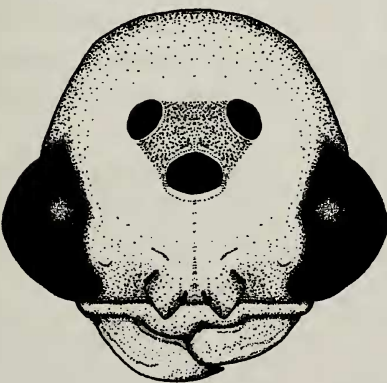
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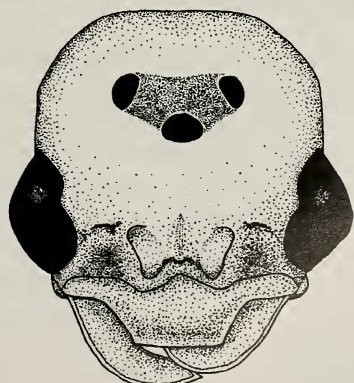
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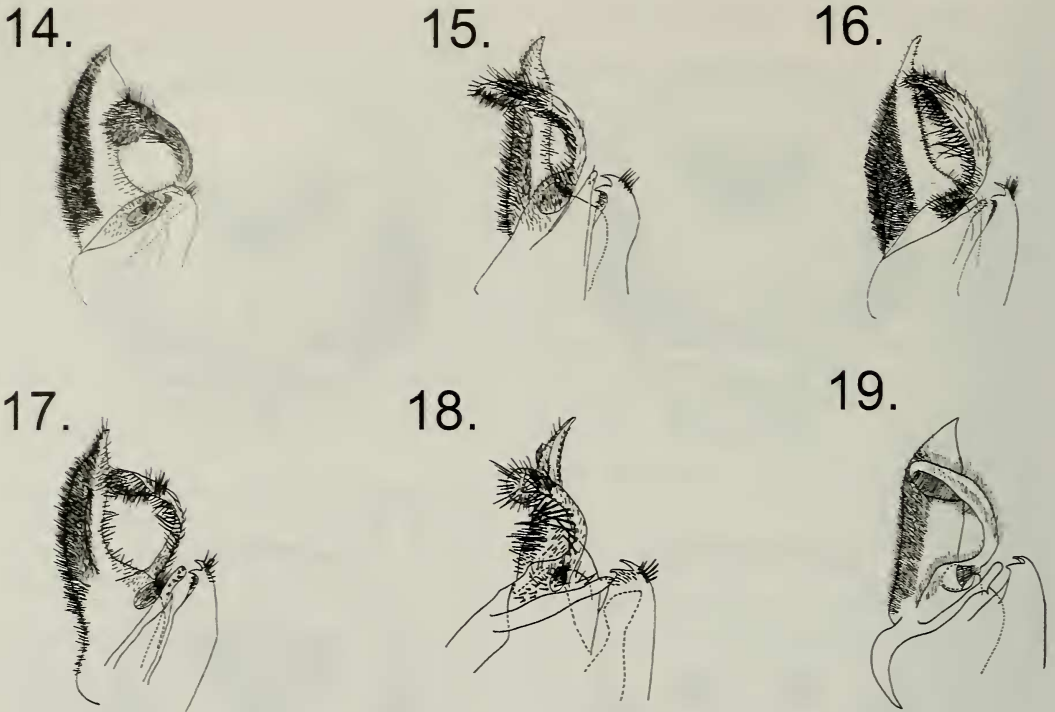
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Figs 8–13. Frontal view of head of *Acanthophotopsis bequaertii* (8), *A. bifurca* (9), *A. dorophora* (10), *A. evansii* (11), *A. falciformis* (12), and *A. snellingi* (13).



Figs. 14–19. Genitalia, lateral view, *Acanthophotopsis bequaertii* (14), *A. bifurca* (15), *A. dorophora* (16), *A. evansii* (17), *A. falciformis* (18), and *A. snellingi* (19).

Acanthophotopsis dorophora Schuster

Acanthophotopsis dorophora Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 104. male. Holotype: Arizona, Tucson, 26.Aug.1935, coll. O. Bryant (UMIC).

Male diagnosis.—*Acanthophotopsis dorophora* is identified by the following set of unique characteristics: the mandibles are tridentate and the dorsal carina of the mandible is complete, reaching from the base of the mandible to the innermost tooth, and the apex of the mandible is vertical apically (Fig. 4). Although the surface of the clypeus just anterior to its base is slightly raised, it lacks a median tubercle or transverse carina. The clypeus is horizontally produced, or plate-like. The head behind the eyes is elongate, with the margins of the head just posterior to the eyes almost parallel for a distance equal to one half the length of the eye (Fig. 10). Other characters also useful in identifying

A. dorophora are: 1) the frons and vertex are coarsely punctate, and the area between the punctures of the vertex is highly polished, 2) the length of F1 is $2.75\times$ its width, 3) the length of the stigma is $0.95\times$ the length of the marginal cell along the costa, and 4) the paramere tapers evenly from the base to the apex, and ends in an acute angle (Fig. 16).

Material examined.—**Arizona**, Yuma Co.: Yuma, 1 ♂*, 15.Oct.1958, coll. V. Roth (UAIC); Yuma, 1 paratype ♂, 21.VIII.1930, coll. H.M. Smith (NMNH); 12 mi NE Yuma, Gila River valley, 1 ♂, 29.May.1961, coll. H.F. Howden (EMUS). **California**, Imperial Co., Algodones Dunes: Cahuilla Ranger Sta. 10 km WSW Glamis, 1 ♂, 22.Sep–15.Nov.2008, E. Dreyfus (UCDC); Brawley, 1 ♂, 22.Jun.2004, coll. K.A. Williams (KAWC).

Remarks.—Previously, this species was known from only the holotype. This species could be confused with *A. snellingi*, sp. nov. See the discussion for the latter

species for characters useful in distinguishing these two species.

Acanthophotopsis evansii Schuster

Acanthophotopsis evansii Schuster, 1958. Ent. Amer. (n. s.) 37: 12 (in key), 93. male. Holotype: Mexico, Durango, San Juan Del Rio, 7.Aug.1951, coll. H.E. Evans (CUIC).

Male diagnosis.—*Acanthophotopsis evansii* is identified by the following set of unique characters. The mandibles are tridentate, the dorsal carina of the mandible is complete to the innermost tooth; the apex of the mandible is vertical apically (Fig. 5). The base of the clypeus is slightly raised, but not produced into a carina or a tubercle. The clypeus is only slightly horizontally produced, and not plate-like. The head behind the eyes is strongly convergent (Fig. 11). Other characters useful in identifying *A. evansii* are: 1) the frons of *A. evansii* is coarsely punctate with shallow punctures while the vertex is moderately punctate; 2) the length of F1 is $2.5\times$ its width; 3) the length of the stigma is $0.7\times$ the length of the marginal cell along the costa; 4) the paramere in lateral view is equally broad throughout its length except for the apex, which narrows to an acute angle; and 5) the paramere is $2-3\times$ as broad as the cuspis medially (Fig. 17).

Material examined.—**USA: New Mexico**, Eddy Co., White's City, 1 ♂, 12.Jul.1966, coll. W.E. Ferguson (CISC); **Texas**, Brewster Co.: Big Bend National Park, Chisos Mts., The Basin, 5400–6000', 1 ♂, 9.May.1959, 3500–4000', 1 ♂, 24.May.1959, coll. W.R.M. Mason (EMUS), 1 paratype ♂, 8–14.Jul.1948, coll. H.E. Evans (NMNH), Panther Jct., 1 ♂, 31.Aug.1971, coll. E.E. Grissell and R.F. Denno; Chisos Mts., 1 paratype ♂, 10–12.Apr. 1908, coll. Mitchell and Cushman (NMNH). **MEXICO: Chihuahua**, 1 ♂, 13.Jul. 1964, coll. J.A. Chemsak (CISC); **Coahuila**, Serrino, Buena Vista, Sierra del Carmen, 6000', 2 ♂*, 18.Jul.1938, coll. R.H. Baker (UMSP, UAIC); **Durango**, Nombre de Dios, 1 paratype ♂, 4.Aug.1951, 1 paratype ♂, 5.Aug.1951, 1 paratype ♂, 6.Aug.1951, coll. H.E. Evans (NMNH), 1 ♂, 6.Aug.1951, coll. P.D. Hurd (EMUS).

Remarks.—Previously this species was known from the holotype and five paratypes. Although this species has a complete dorsal mandibular carina and lacks a clypeal tooth, the clypeal shape differs from *A. dorophora* and *A. snellingi*, sp. nov., which also have this set of characters.

Acanthophotopsis falciformis Schuster

Acanthophotopsis falciformis falciformis Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 108. male. Holotype: California, Palm Springs, fall.1932, coll. T. Zschokke (UMIC).

Acanthophotopsis falciformis furcisterna Schuster, 1958. Ent. Amer. (n. s.) 37: 14 (in key), 111. male. Holotype: Arizona, Tucson, 5.Oct.1935, coll. O. Bryant (UMIC). **NEW SYNONYM.**

Male diagnosis.—*Acanthophotopsis falciformis* is easily identified by the presence of a fourth mandibular tooth, which is found along the internal margin and projects posteriorly over the apex of the clypeus (Fig. 6). Other characters useful in identifying *A. falciformis* are: 1) the dorsal carina of the mandible extends from the base of the mandible to the innermost tooth; 2) the base of the clypeus is slightly raised, although neither carinate nor tuberculate and not horizontally produced; 3) the frons is coarsely punctate while the vertex is moderately punctate; 4) the length of the first flagellomere is $2\times$ its width; 5) the head behind the eyes is strongly convergent (Fig. 12); 6) the length of the stigma is $0.8\times$ the length of the marginal cell along the costa; and 7) the paramere in lateral view is equally broad throughout its length except for the apex, which narrows to an acute angle, and the paramere is as broad as the cuspis medially (Fig. 18).

Material examined.—**USA: Arizona**, Apache Co.: McNary, 1 ♂, 4.May.1963, coll. Bedall (UAIC); **Coconino Co.**: 2 ♂, 16.Aug.1940, 5 ♂, 23.Aug.1940, coll. F.W. Nunenmacher (UMSP); **Gila Co.**: Christmas, 3 mi SW nr Gila River, 1 ♂, 4.Jun.1962, coll. F. Werner (UAIC); **Globe**, 1 ♂, 8.Aug.1933, 1 ♂, 18.Aug.1936, coll. F.H. Parker (UMSP); **La Paz Co.**: Ehrenberg, 5 ♂, 22.Mar.1940 (UMSP); **Graham Co.**: Bonita

- Creek, 3500', 1 ♂, 17.Aug.1976, coll. D.S. Chandler (UAIC); *Maricopa Co.*, Maricopa Mts., 1 ♂, 12.Apr.1947, coll. H.&M. Townes (AEIC); Phoenix, 17.May.1941 (UMSP); Mesa, 8 mi. NE, 1 ♂, 28.Apr.1964, coll. W.E. Ferguson (CASC); *Pima Co.*, Ajo, 2 ♂, 8.Apr.1947, coll. H.&M. Townes (AEIC); Arizona Sonora Desert Museum, 5 ♂, 9–16.Aug.1962, 4 ♂, 21–24.Aug.1962, coll. W.L. Nutting and S. Owen (UAIC); Ajo Mts., Alamo Canyon, 1 ♂, 24.Jul., coll. J.W. Green (CASC); Organ Pipe Nat. Mon., 2 ♂, 14.Apr.1955, coll. Butler and Werner (UAIC), 1 ♂, 17.Apr.1955, coll. J. Eden (UAIC), 3 ♂, 17.Aug.1955, coll. J. Eden (UAIC); Pusch Peak, W slope, Santa Catalina Mts., 2800', nr Hardy Rd and Hwy 80, 1 ♂, 17.May.1963, coll. C.E. Mickel (UMSP); Sabino Cyn., Santa Catalina Mts., 1 ♂, 22.Apr.1965, coll. J. Hessel and J. Burger (UAIC); Saguaro Nat. Mon., 1 ♂, 18.May.1961, coll. G.D. Butler (UAIC); Tucson, 1 ♂, 4.May.1963, 2 ♂, 6.May.1963, 1 ♂, 12.May.1963, 1 ♂, 8.May.1963, 1 ♂, 14.May.1963, coll. C.E. Mickel (UAIC), 10.Aug.1959, coll. K.W. Radford (UAIC), 1 ♂, 9.Aug.1928, coll. A.A. Nichol (UAIC), 16 ♂, 26.Aug.1939, coll. O. Bryant (UMSP); Tucson, N end Campbell Ave., Santa Catalina Foothills, 6 ♂, 5.Aug.1967, coll. M.S. Noller (UAIC); Tucson Mtn Park, 1 ♂, 14.Apr.1990, coll. W.E. Ferguson (CASC); *Santa Cruz Co.*: Patagonia, 1 ♂, 21.Aug.1940, coll. F.W. Nunenmacher (UMSP); *Yuma Co.*: Tinajas, Atlas Mts., 1 ♂, 26.Aug.1930, coll. L.K. Gloyd (EMUS). **California**, Algodones Dunes, Niland-Glamis Rd., 7.4 km NW Glamis, 1 ♂, 3–30.May.2008, S. Heydon and K. Lorenzen (UCDC); *Imperial Co.*, Glamis, 3.5 mi NW, Algodones Dunes, 1 ♂, 13.Apr.1964, (UCRC); Glamis, 7 mi. E, 5 ♂, 11–12.Apr.1973, M.S. Wasbauer (CDFA); Pothole, 1 ♂, 9.Apr.1923, coll. E.P. VanDusee (CASC); *Riverside Co.*: Corn Spg., 5 mi. S Desert Center, 2 ♂, 24.Jun.2004, coll. K.A. Williams (KAWC); Deep Canyon, 5 ♂, 2.May.1963, coll. E.I. Schlinger (UCRC), 2 ♂, 3.May.1963, coll. E.I. Schlinger (UCRC), 3 ♂, 16.May.1963, coll. E.I. Schlinger (UCRC), 1 ♂, 30.May.1963, coll. E.I. Schlinger (UCRC), 2 ♂, 8.Oct.1963, coll. M.E. Irwin and E.I. Schlinger (UCRC), 12 ♂*, 9.Oct.1963, coll. M.E. Irwin and E.I. Schlinger (UCRC, EMUS); McCoy Springs, 8.Apr.1963, coll. E.I. Schlinger and J.C. Hall (UCRC); Palm Desert, 1 ♂, 11.Apr.1950, coll. L.W. Quate (EMUS); Junction Horsethief Cr. and Deep Cr., 8 mi. N, 2960 ft, 3 ♂, 30.Jun.–1.Jul.1969, coll. A. Tabet (UCRC); Palm Cyn Dr. and Bogart Tr., 1 ♂, 23.May.2001, coll. D. Hawks (UCRC); PL Boyd Des. Res. Center, Deep Canyon, 1 ♂ (UCRC); PL Boyd Des. Res. Center, 2 ♂, 18.May. 1969, coll. M.E. Erwin (UCRC); PL Boyd Des. Res. Center, 2 ♂, 21–29.May. 1973, coll. A.B. Tabet (UCRC); PL Boyd Des. Res. Center, 2 ♂, 27.May.–1.Jun.1970, coll. S. Frommer and R. Worley (UCRC); PL Boyd Des. Res. Center, 2 ♂, 18.May. 1969, coll. M.E. Erwin (UCRC); PL Boyd Des. Res. Center, 1 ♂, 24.May.1969, coll. M.E. Erwin and S. Frommer (UCRC); PL Boyd Des. Res. Center, 3 ♂, 13–18.Jun.1969, coll. S. Frommer and B. Worley (UCRC); PL Boyd Des. Res. Center, 1 ♂, 15.Jun.1969, coll. S. Frommer and L. LaPré (UCRC); PL Boyd Des. Res. Center, 3 ♂, 18–19.Jun.1969, coll. S. Frommer and B. Worley (UCRC); PL Boyd Des. Res. Center, 4 ♂, 20–24.Jun.1969, coll. S. Frommer and B. Worley (UCRC); PL Boyd Des. Res. Center, 3 ♂, 2–3.Jul.1969, coll. S. Frommer and R.M. Worley (UCRC); *San Bernardino Co.*: Baker, 9 air mi. S, Zzyzx Sprs., 1 ♂, 22.Apr.1977, coll. Buegler (CISC), Needles, 1 ♂, 5.May.1939, coll. E.P. VanDusee (CASC), Rice, 4 mi. S, 5 ♂, 3.Aug.1962, coll. W.E. Ferguson (CASC); Zyzzyx, Soda Springs, 1 ♂, 9.Aug.1986, coll. R.A. Read (EMUS). *San Diego Co.*, Borrego V, 1 ♂, 20.May.1941, coll. E.C. Van Dyke (CASC); *Nevada*, *Clark Co.*, Logandale, 1 ♂, 5.Aug.1959, coll. F.D. Parker (NVDA); *Nye Co.* Mercury, 1 ♂, 21.Aug.1964 (BYUC); 5 ♂, 23.Aug.1964 (BYUC). **MEXICO**: *Sonora*, 1 ♂, 1–10.Sep.1953, coll. B. Malkin (CASC).
- Paratypes of *A. f. furcisterna*:** Arizona, Tucson, 1 ♂, 26.Aug.1939, coll. O. Bryant (NMNH).
- Paratypes of *A. f. falciformis*:** California, Palm Springs, 1 ♂, fall 1932, coll. T. Zschokke (NMNH). Arizona, Ehrenberg, 1 ♂, 27.Apr.1939, coll. F.H. Parker (NMNH).
- Remarks.**—Schuster (1958) separated *A. falciformis sensu stricto* from *A. f. furcisterna* based on the shape of the head posterior to the eyes, with the former having poorly developed temples and a strongly convergent vertex in contrast to *A. f. furcisterna*, which has well developed temples and a more rounded vertex. A review of preserved museum specimens has failed to yield a noticeable difference in the shape of

the head. Schuster also reported that the metasoma of *A. f. furcisterna* was darker than in *falciformis*. We found this not to be the case. Some specimens of *A. f. furcisterna* from Arizona lack castaneous or piceous pigmentation ventral to the felt line and some specimens of *A. f. falciformis* from Riverside Co., California, have castaneous and piceous pigmentation ventral to the felt line.

Schuster (1958) also reported a difference in the size of the eyes of these two subspecies, as measured by the relative proportions of the frons and the width of the head. The frons of *A. f. falciformis* (0.47–0.49) is narrower than *A. f. furcisterna* (0.53–0.55) due to the encroachment of the eyes (Schuster, 1958). Our measurements, however, show that the range of *A. f. falciformis* (0.46–0.49) overlaps with the range of *A. f. furcisterna* (0.46–0.52), although *A. f. furcisterna* has, on average, a broader frons. Schuster (1958) also reported that the ocelli in *A. f. falciformis* were very large with the ocellocular distance (1.15–1.25) much shorter than that in *A. f. furcisterna* (1.4–1.7). As with the relative width of the frons, we found that *A. f. furcisterna* has, on average, a larger distance between the eyes and ocelli relative to the length of the ocelli (1.4–1.5) than does that of *A. f. falciformis* (1.2–1.5), but there is much overlap in the ranges of these two subspecies.

Schuster (1958) reported that the mesosternal processes of *A. f. furcisterna* were sickle-shaped and differed from that of *A. f. falciformis*. We found variation and overlap in the shape of the processes between the two subspecies. We compared the basal width of the mesosternal process to their length in *A. f. furcisterna* (0.65–1.0) and *A. f. falciformis* (0.75–1.0), and found that proportional size of the process is similar between the two.

Lastly, study of the genitalia uncovers no discernable differences between these two subspecies. These discrepancies are not unexpected given that Schuster only had four specimens each of *A. f. falciformis* and

A. f. furcisterna with which to work. Because of the overlap in the various measurements discussed above and lack of discernable differences, we consider these two subspecies synonymous.

Acanthophotopsis snellingi Tanner & Pitts, New Species

Male diagnosis.—*Acanthophotopsis snellingi* is distinguishable from the other species of *Acanthophotopsis* by having the following combination of characters.) The mandibles are tridentate, and the dorsal carina of the mandible is complete to the innermost tooth and the apex of the mandible is vertical (Fig. 7). The basal margin of the clypeus lacks a carina and a central tubercle, is horizontally produced and covered in short, dense setae. The head behind the eyes is elongate, with the margins of the head just posterior to the eyes almost parallel for a distance equal to one half the length of the eye (Fig. 13). Other characters useful in identifying *A. snellingi* are: 1) the frons is moderately punctate while the vertex has small punctation; 2) the length of F1 is 1.5–2× its width; 3) the length of the stigma is 0.8× the length of the marginal cell along the costa; and 4) the paramere, in lateral view is equally broad throughout its length except for the apex, which narrows to an acute angle, and the paramere is 4× as broad as the cuspis medially (Fig. 19).

Description.—*Setal pattern and coloration:* Body covered in brachyplumose setae that are uniformly white, except pale golden on mesonotum; most dense along posterior margins of tergites. Weak fringe of sparse white brachyplumose to plumose setae present on apical fringes of metasoma. Head, mesosoma and metasoma reddish-brown, except ocellar triangle dark reddish-brown, clypeus light reddish-brown, and apex of metasoma becoming piceous. Wings hyaline basally, veins brown, and slightly infuscate apically. Coxae and trochanters concolorous with body. Antennae,

20.

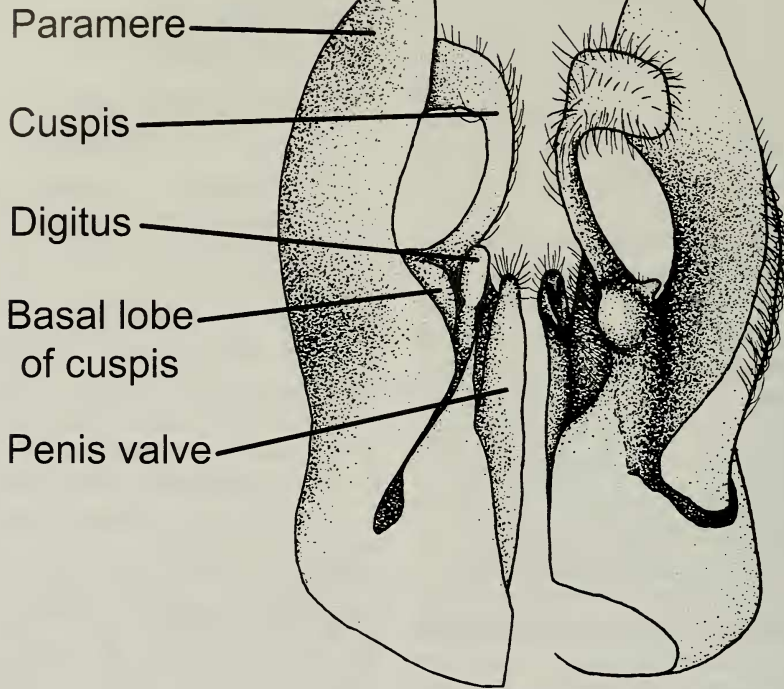


Fig. 20. Dorsal (left) and ventral (right) view of genitalia of *Acanthophotopsis snellingi*.

tibiae, femora, and tarsi noticeably darker than body, piceous, concolorous with apex of metasoma. Petiole concolorous with mesosoma.

Head.—Elongate posterior to eyes, lateral margin parallel for one half length of eye. Mandible tridentate; second tooth greatly reduced, attached to first tooth for almost entire length. Dorsal carina extending from mandible base to dorsal tooth. Clypeus without central tubercle or carinate basal margin; projecting anteriorly, horizontal. Interocular distance $3.5\times$ eye width. Head moderately to coarsely punctate, glabrous between punctures. Ocellocular distance more than $2\times$ diameter of lateral ocellus. Diameter of lateral ocellus as large as intraocellar distance. F1 $3.3\times$ as long as free length of pedicel. F2 $3\times$ as long as free length of pedicel. F3 $2.7\times$ as long as free length of pedicel.

Mesosoma.—Pronotum and mesopleuron continuously reticulate. Mesosternal process acutely triangular, directed posteriorly. Tegula triangular, glabrous apically. Propodeum continuously reticulate, with large areolets basally. Wings setose, setae dark brown. Middle tibia swollen, widest at apex. Stigma $\sim 0.8\times$ length of marginal cell along the costa.

Metasoma.—First segment petiolate with second. T1 coarsely punctate throughout. T2 and S2 weakly punctate. Remaining sclerites micropunctate. S2 lacking felt line. Pygidium glabrous, apical fringe present.

Genitalia.—Paramere stout, narrowing only at apex to acute angle (Figs 19, 20); setose only on external ventral margin (Figs 19, 20). Cuspis elongate, externally curved, spatulate apically (Figs 19, 20). Pit at base of cuspis large, extending across most of cuspis width, with long centrally

directed setae (Figs 19, 20). Digitus short, cylindrical, setose apically (Figs 19, 20).

Type Material.—HOLOTYPE: **Mexico**, *Zacatecas*, 9 mi S. of Fresnillo, 1 ♂, 18.Aug.1956, coll. D.D. Linsdale (CISC). PARATYPES: **Mexico**, *Zacatecas*, 9 mi S. of Fresnillo, 1 ♂, 20.Aug.1956, coll. D.D. Linsdale (CISC); *Chihuahua*, 32 mi S. Hidalgo de Parrel, 1 ♂, 21.Aug.1960, coll. P.H. Arnaud, Jr., E.S. Ross, D.C. Rentz (CASC).

Etymology.—Named in honor of Roy Snelling for his great contribution to Hymenoptera taxonomy.

Remarks.—*Acanthophotopsis snellingi* differs from *A. bequaertii* and *A. bifurca* by several characters. The mandible of *A. snellingi* has a complete dorsal carinae and the tip of the mandible is vertical. *Acanthophotopsis snellingi* lacks a postero-medial tubercle on the clypeus. Both *A. bequaertii* and *A. bifurca* have an incomplete dorsal carina on the mandible, the apex of

the mandible is oblique, and they both possess a distinct posteromedial tubercle on the clypeus. Additionally, the length of the marginal cell along the costa relative to the stigma (approximately 1:1) in *A. bequaertii* is much larger than in *A. snellingi*. The legs and the metasoma are nearly black in *A. bequaertii*, whereas they are much lighter in *A. snellingi*. The quadridentate mandible of *A. falciformis* is not easily confused with that of *A. snellingi*.

Acanthophotopsis snellingi is most like *A. dorophora*. The antenna, however, of *A. dorophora* is much longer and more slender, than in *A. snellingi*. The second antennal segment is 3.75× longer than its width in *A. dorophora* and 2.5–3 times longer than its width in *A. snellingi*. The head behind the eyes is strongly convergent in *A. evansii*, while elongate *A. snellingi*. Lastly, the genitalia differ significantly (Figs 15, 19).

KEY TO THE SPECIES OF ACANTHOPHOTOPSIS

- 1 Mandible quadridentate: three apical teeth and fourth large tooth on internal margin whose apex forms an obtuse angle that overhangs the clypeus when mandible in repose; fourth tooth directed posteriorly and located ½ the distance from the base of the mandible (southern Utah, Nevada, Arizona, and California) *A. falciformis* Schuster
- Mandible tridentate 2
- 2(1) Dorsal carina on mandible not complete, ending before innermost apical tooth; base of clypeus with median longitudinal carina and central tubercle, apex of mandible oblique 3
- Dorsal carina on mandible complete, extending from mandible base to innermost apical tooth, apex of mandible vertical (Figs 4, 5, and 7); base of clypeus without median longitudinal carina or central tubercle 4
- 3(2) Posterior margin of head elongate (Fig. 8); metasoma piceous; stigma as long as marginal cell along the costa; genitalia as in Fig. 14 (southeastern Arizona and Chihuahua and Durango, Mexico) *A. bequaertii* Schuster
- Posterior margin of head rounded and converging; metasoma reddish brown, at most apical segments darkened; stigma 0.75× the length of marginal cell along the costa; genitalia as in Fig. 15 (western Texas, Oklahoma and eastern New Mexico) *A. bifurca* Schuster
- 4(2) Head converging directly behind the eyes (Fig. 11); clypeus not plate-like, mostly vertical; genitalia as in Fig. 17; metasoma piceous (southeastern Arizona and Chihuahua and Coahuila, Mexico) *A. evansii* Schuster
- Head elongate posteriorly, lateral margins of head parallel for ½ the length of the eyes (Fig. 10, 13); clypeus plate-like, mostly horizontal; metasoma reddish brown, at most apical segments darkened 5

- 5(4) Paramere tapering towards apex (Fig. 16); marginal cell length $\sim 1.05\times$ length of stigma measured along costa; length of F1 greater than $2.5\times$ its width (southwestern Arizona and southern California) *A. dorophora* Schuster
- Paramere wide until just before apex (Fig. 19, 20); marginal cell length $\sim 1.25\times$ length of stigma measured along costa; length of F1 $2.5\times$ or less its width (Zacatecas, Mexico) *A. snellingi* Tanner & Pitts
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